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# Immediate Percutaneous Coronary Intervention Is Associated With Better Survival After Out-of-Hospital Cardiac Arrest

## Insights From the PROCAT (Parisian Region Out of Hospital Cardiac Arrest) Registry

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***Background***—Acute coronary occlusion is the leading cause of cardiac arrest. Because of limited data, the indications and timing of coronary angiography and angioplasty in patients with out-of-hospital cardiac arrest are controversial. Using data from the Parisian Region Out of hospital Cardiac ArresT prospective registry, we performed an analysis to assess the effect of an invasive strategy on hospital survival.

***Methods and Results***—Between January 2003 and December 2008, 714 patients with out-of-hospital cardiac arrest were referred to a tertiary center in Paris, France. In 435 patients with no obvious extracardiac cause of arrest, an immediate coronary angiogram was performed at admission followed, if indicated, by coronary angioplasty. At least 1 significant coronary artery lesion was found in 304 (70%) patients, in 128 (96%) of 134 patients with ST-segment elevation on the ECG performed after the return of spontaneous circulation, and in 176 (58%) of 301 patients without ST-segment elevation. The hospital survival rate was 40%. Multivariable analysis showed successful coronary angioplasty to be an independent predictive factor of survival, regardless of the postresuscitation ECG pattern (odds ratio, 2.06; 95% CI, 1.16 to 3.66).

***Conclusions***—Successful immediate coronary angioplasty is associated with improved hospital survival in patients with or without ST-segment elevation. Therefore, our findings support the use of immediate coronary angiography in patients with out-of-hospital cardiac arrest with no obvious noncardiac cause of arrest regardless of the ECG pattern. **(*Circ Cardiovasc Interv*. 2010;3:200-207.)**

**Key Words:** cardiac arrest ■ PCI ■ angioplasty ■ catheterization ■ electrocardiography

Out-of-hospital cardiac arrest (OHCA) is a leading cause of death in western countries. Each year, >225 000 people in the United States die suddenly mostly because of coronary heart disease.[1,2] Despite recent advances in public education and resuscitation process, few patients will survive up to hospital admission and even fewer will be discharged alive from the hospital. Hospital survival rates remain low, ranging from 21% to 33%, and clearly have not improved in recent years.[3–5]

**Editorial see p 197**
**Clinical Perspective on p 207**

Based on past clinical studies, recent guidelines recommend that patients resuscitated from OHCA who have electrocardiographic criteria for myocardial infarction with ST-segment elevation should undergo immediate coronary angiography with subsequent percutaneous intervention (PCI), if indicated. However, the predictive value of the ECG for coronary artery occlusion is poor, and clinical data such as chest pain or risk factors often are lacking in the setting of OHCA.[6–8] Furthermore, given the high incidence of acute coronary syndrome (ACS) in patients with OHCA, guidelines also recommend considering immediate coronary angiography in all patients with postcardiac arrest in whom ACS is suspected.[9,10] Therefore, it is difficult in clinical practice to select candidates for early coronary angiography, especially

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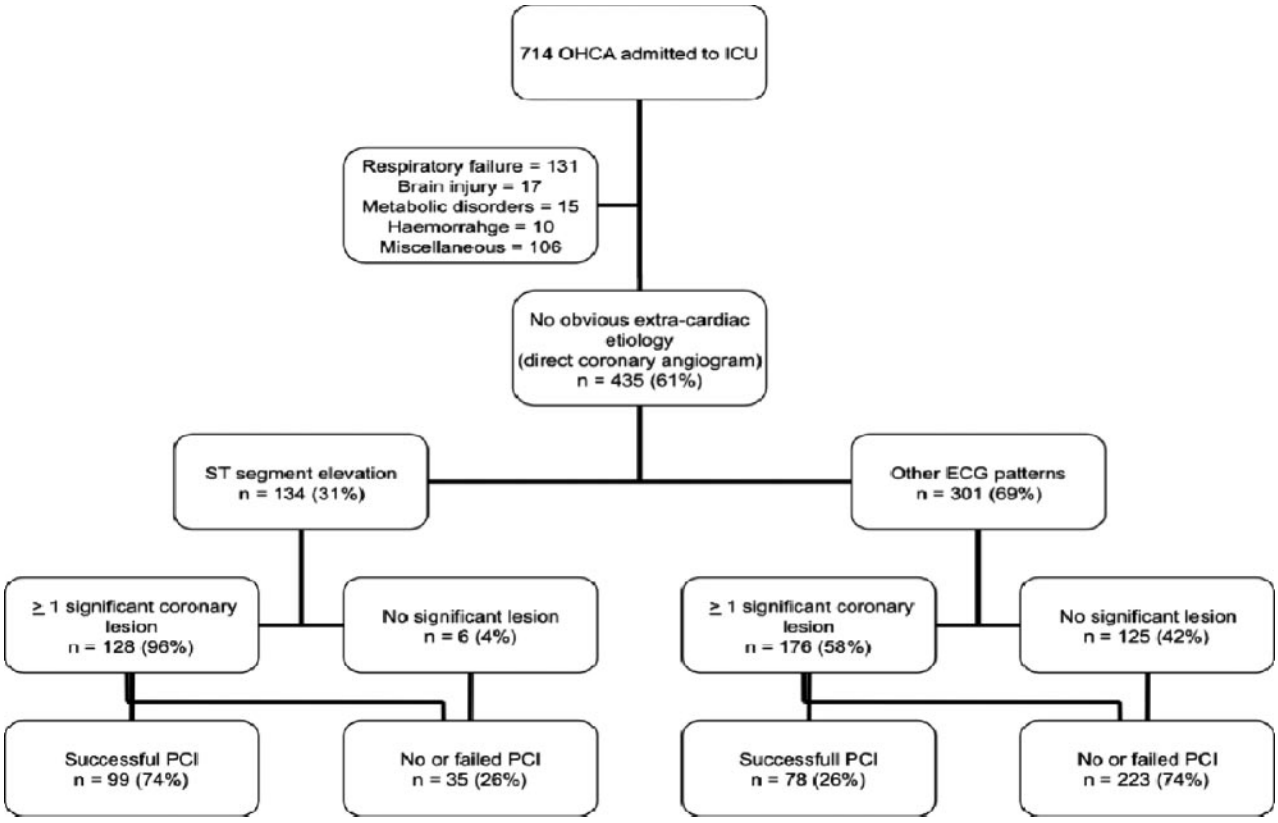


**Figure 1.** Patients post-ROSC admitted to the intensive care unit.

in patients without ST-segment elevation in whom this strategy occasionally is challenged.[11] Further clinical studies are necessary to determine whether immediate coronary angiography and PCI should be performed in all patients with OHCA after return of spontaneous circulation (ROSC).[9]

As a tertiary center, our multidisciplinary team is specialized in the management of patients with OHCA from a large urban area (Paris, France). An immediate emergency coronary angiography followed by PCI, if indicated, has been incorporated in our routine practice since 1994 in all patients with OHCA with no obvious extracardiac cause of arrest, regardless of ECG pattern.[6] Using data from the Parisian Region Out of hospital Cardiac ArresT (PROCAT) prospective registry, we assessed whether a strategy that leads to an immediate revascularization can improve the outcome in patients admitted to the hospital after a cardiac arrest presumed to be of cardiac origin.

## Methods

### Study Setting and Population

In Paris, management of OHCA involves mobile emergency units and fire departments. They cover a population of ≈5 million during the day and 2.5 million at night. On witnessed call and in suspected cases of sudden cardiac arrest, the closest emergency unit is dispatched on the scene. Out-of-hospital resuscitation is delivered by an emergency team, which includes at least 1 trained physician in emergency medicine according to the European Society of Cardiology guidelines.[10] Patients in whom ROSC is achieved are then referred to a tertiary center with an intensive care unit and coronary intervention facilities available 24 hours a day, 7 days a week. According to the Utstein template,[12] resuscitated patients with obvious extracardiac causes, such as respiratory failure, brain stroke, metabolic disorder, hemorrhage, or any noncardiac cause, are explored and treated according to standard critical care procedures. In the absence of an obvious extracardiac cause, patients are admitted directly to the cardiac catheterization laboratory, regardless of clinical and ECG findings. An immediate coronary angiogram and a left ventricular angiography are performed using standard techniques. A PCI is attempted if there is an acute coronary artery occlusion or if there is an unstable lesion that could be considered as the cause of cardiac arrest. After the procedure, patients are admitted to the intensive care unit for supportive treatment, which includes therapeutic hypothermia.

### Data Analysis

Patients' data were prospectively entered in the PROCAT electronic registry database that was created in 2003. All cases from January 2003 to December 2008 are included in the present analysis. OHCA data were collected according to Utstein recommendations[12] and included age and sex; cardiovascular risk factors such as hypertension, diabetes mellitus, dyslipidemia, and current smoking; location of cardiac arrest; and initial cardiac rhythm (shockable or not). The delays between the onset of OHCA and basic life support (BLS) and between BLS and ROSC (minutes) were estimated by the emergency medical service team. The blood lactate level and troponine level were measured at hospital admission, and the use of therapeutic hypothermia was noted. If not contraindicated, a mild therapeutic hypothermia (between 32°C and 34°C) during the first 24 hours was systematically implemented at hospital admission. In the absence of shock or complications, sedation was interrupted at the end of the hypothermia period. Temperature was then maintained between 37°C and 38°C, and patients were extubated as soon as their neurological and respiratory status allowed it. Coronary angiographic data were prospectively entered. A coronary lesion resulting in a >50% reduction in luminal diameter by visual estimation was considered clinically significant. PCI was deemed successful if it

**Table 1. Characteristics of Patients With OHCA According to ECG Patterns**

| | Overall (n=435) | ST-Segment Elevation (n=134) | Other ECG Pattern (n=301) | *P** |
|---|---|---|---|---|
| Male sex | 359 (83) | 113 (84) | 246 (81) | 0.55 |
| Age, y† | | | | 0.92 |
| ≤59 | 216 (50) | 67 (50) | 149 (50) | |
| >59 | 219 (50) | 67 (50) | 152 (50) | |
| Risk factors | | | | |
| Hypertension | 168 (42) | 48 (38) | 120 (43) | 0.52 |
| Diabetes mellitus | 71 (18) | 16 (14) | 55 (21) | 0.10 |
| Dyslipidemia | 118 (31) | 38 (33) | 80 (29) | 0.55 |
| Smoking | 179 (53) | 60 (58) | 119 (51) | 0.21 |
| Location of cardiac arrest | | | | 0.87 |
| Outside | 166 (38) | 52 (39) | 114 (38) | |
| Home | 170 (39) | 50 (37) | 120 (40) | |
| Other | 99 (23) | 32 (24) | 67 (22) | |
| Time from collapse to BLS, min† | | | | 0.008 |
| <5 | 204 (49) | 76 (59) | 128 (45) | |
| ≥5 | 210 (51) | 53 (41) | 157 (55) | |
| Time from BLS to ROSC, min† | | | | 0.06 |
| ≤15 | 223 (53) | 78 (60) | 145 (49) | |
| >15 | 201 (47) | 53 (40) | 148 (51) | |
| Initial arrest rhythm | | | | 0.28 |
| VT/VF | 294 (68) | 96 (72) | 198 (66) | |
| PEA/asystole | 138 (32) | 38 (28) | 100 (34) | |
| Lactate blood, mmol/L‡ | | | | 0.80 |
| ≤2 | 101 (23) | 33 (25) | 68 (23) | |
| 2 to 4.9 | 104 (24) | 28 (21) | 76 (25) | |
| 4.9 to 7 | 96 (22) | 30 (22) | 66 (22) | |
| >7 | 134 (31) | 43 (32) | 91 (30) | |
| Troponine, μg/L‡ | | | | <0.001 |
| <2.3 | 159 (41) | 27 (23) | 132 (49) | |
| 2.3 to 11.8 | 105 (27) | 31 (26) | 74 (27) | |
| >11.8 | 124 (32) | 60 (51) | 64 (24) | |
| Therapeutic hypothermia | 370 (86) | 108 (82) | 262 (88) | 0.09 |

Data are presented as n (%), taking into account missing data. VT indicates ventricular tachycardia; VF, ventricular fibrillation; and PEA, pulseless electrical activity.

*$P$ values for comparison between ST-segment elevation group and other ECG patterns group obtained from a $\chi^2$ test.

†Age, time from collapse to BLS, and time from BLS to ROSC were classified according to their respective medians.

‡Lactate blood and troponine were classified according to interquartiles.

resulted in residual stenosis of <50% with Thrombolysis in Myocardial Infarction grade 3 flow.

The current population was divided into 2 subgroups according to the post-ROSC ECG pattern (ie, ST-segment elevation and other ECG patterns). An ST-segment elevation was defined as an elevation of ≥1 mm in 2 contiguous leads in standard leads and ≥2 mm in precordial leads. The primary outcome was hospital survival at discharge. Neurological status at that time was assessed by using the Cerebral Performance Categories (CPC) scale.[13] In brief, CPC levels 1 and 2 indicate patients who recovered without major neurological sequelae.

## Statistical Analysis

Descriptive statistics were summarized as proportions for categorical variables and as median (interquartile range) for the quantitative variables. A Pearson $\chi^2$ test was used to identify the risk factors associated with hospital survival, using a $P$ value of <0.05 as statistically significant. Prognostic factors that were found to be significant in preliminary univariate analysis were then simultaneously included in a multivariate logistic regression. All calculations were performed using Stata 10-IC software.

## Results

Between January 2003 and December 2008, 714 patients with OHCA in whom ROSC was obtained on the field were subsequently admitted in our institution (Figure 1). Among them, 279 (39%) with an obvious extracardiac cause of arrest (mostly respiratory failure) were excluded, leaving 435 (61%) patients with no obvious extracardiac cause of arrest as the studied population.

**Table 2. Predictive Values of ST-Segment Elevation for Significant Coronary Lesion and PCI**

| ST-Segment Elevation Predictive Values | Significant Coronary Lesion | Significant PCI |
|---|---|---|
| Positive predictive value | 0.96 | 0.74 |
| Negative predictive value | 0.42 | 0.74 |
| Sensitivity | 0.42 | 0.56 |
| Specificity | 0.95 | 0.83 |

Baseline characteristics are shown in Table 1. The male: female ratio was 4:1, and the median age was 59 years (range, 52.2 to 69.8 years). A delay of <5 minutes between the onset of arrest and BLS and of <15 minutes between BLS and ROSC was found in 49% and 53% of the population, respectively. An automated external defibrillation delivered at least 1 shock in 294 (68%) patients. In the subgroup of patients with an obvious noncardiac cause of arrest, a shock was delivered in 81 (29%) of 279 cases. According to the guidelines, hypothermia was performed in selected patients in 2002 and routinely thereafter. Therefore, nearly 85% of the population had therapeutic hypothermia. The median blood lactate level was 4.9 mmol/L (range, 2 to 7 mmol/L).

On the post-ROSC ECG, an ST-segment elevation was present in 134 (31%) patients. In the remaining 301 (69%) patients, different ECG patterns were noted as follows: ST-segment depression in 127 (29%), conduction disorders in 87 (20%), nonspecific changes in 40 (9%), and no abnormalities in 47 (11%). Table 1 shows the baseline characteristics of patients with and without ST-segment elevation. The delays between collapse and BLS ($P=0.008$) and between BLS and ROSC ($P=0.06$) were higher in patients without ST-segment elevation, therapeutic hypothermia tended to be less frequent in those with ST-segment elevation ($P=0.09$), and the troponine level was higher at admission in patients with ST-segment elevation ($P<0.001$).

In the ST-segment elevation group (n=134), at least 1 significant coronary artery stenosis was found in 128 (96%) patients; PCI was attempted in 110 patients and was successful in 99 (90%). In the 301 patients with other ECG patterns, 176 (58%) had at least a significant stenosis; PCI was attempted in 92 patients and was successful in 78 (85%) (Figure 1).

In the total population, single coronary vessel disease was found in 104 (34%) patients, double-vessel disease in 88 (29%), and triple-vessel disease in 112 (37%). In 202 patients, a culprit lesion could be identified on the left anterior descending artery in 107 (51%) patients, the left main in 9 (4%), the circumflex in 33 (16%), and the right coronary artery in 61 (29%). PCI failure occurred in 25 patients. Reasons for failure were inability to cross the lesion with a guide wire or a balloon (13 cases), extensive dissection with no or low flow that could not be corrected by stent implantation (6 cases), extensive thrombus (4 cases), and coronary rupture (2 cases). There were no differences in lesion distribution between groups with ST-segment elevation and other ECG patterns.

As shown on Table 2, the positive and negative predictive values of the ST-segment elevation pattern for significant

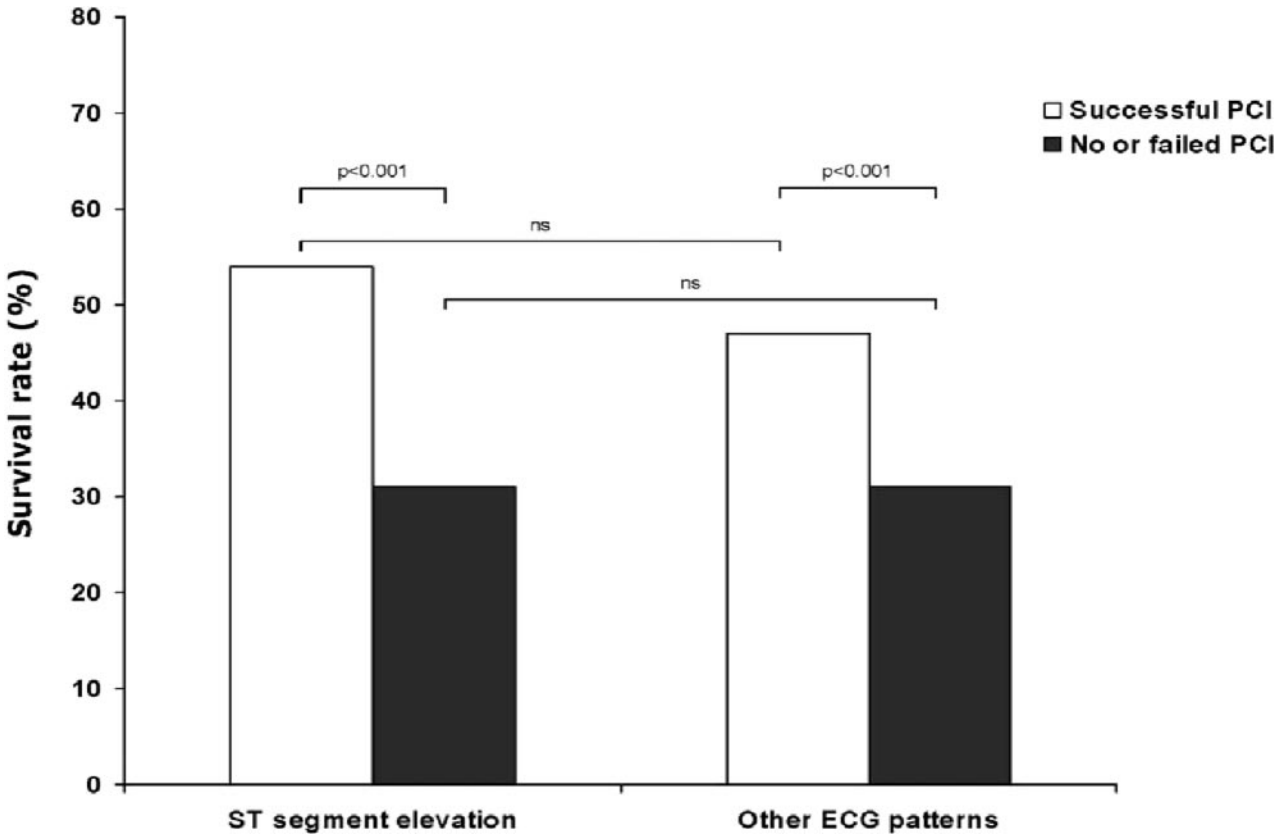


**Figure 2.** Survival rates according to the performance and outcome of PCI. ns indicates not significant.

coronary lesion were 96% and 42%, respectively. These rates reached 74% for successful PCI.

The hospital survival of the 435 patients with an immediate coronary angiography was 39%. Among them, 94% (160 of 171) reached a CPC level of 1 and 2 (96 CPC level 1 and 64 CPC level 2), indicating a favorable neurological outcome. Figure 2 shows the survival rates in subgroups of patients with or without ST-segment elevation. The hospital survival rate was significantly higher in patients in whom a successful PCI was obtained than in patients with no or failed PCI (51% versus 31%; $P<0.001$). This increased hospital survival rate was present both in patients with ST-segment elevation (54% versus 31%, respectively; $P<0.001$) and in patients with other ECG patterns (47% versus 31%, respectively; $P<0.001$). Of interest, survival rates were not different in patients in whom a successful PCI was achieved regardless of the ECG pattern (54% versus 47%; $P=0.42$).

In univariate analysis (Table 3), all risk factors but sex, hypertension, dyslipidemia, and smoking status were related to hospital survival. Age >59 years, diabetes mellitus, location of arrest at home, and high blood lactate were significantly associated with a lower hospital survival rate. On the other hand, ventricular tachycardia/ventricular fibrillation as a first rhythm, use of therapeutic hypothermia, delays between collapse and BLS and between BLS and ROSC, presence of an ST-segment elevation, and successful PCI were associated with a better prognosis.

The multivariable odds ratios (ORs) and 95% CIs of risk factors for hospital survival are presented on Figure 3. A delay between BLS and ROSC >15 minutes (OR, 0.28; 95% CI, 0.19 to 0.55), delay between cardiac arrest onset and BLS ≥5 minutes (OR, 0.32; 95% CI, 0.17 to 0.49), diabetes mellitus (OR, 0.42; 95% CI, 0.20 to 0.84), age >59 years (OR, 0.45; 95% CI, 0.27 to 0.75), initial rhythm as asystole or pulseless electrical activity (OR, 0.51; 95% CI, 0.30 to 0.88), and higher blood lactate at admission (OR for each quartile increase, 0.55; 95% CI, 0.44 to 0.70) were associated with a worse prognosis. On the other hand, a successful PCI (OR, 2.06; 95% CI, 1.16 to 3.66) was related to a better prognosis. In this model, ST-segment elevation was no longer a significant predictor of hospital survival.

**Table 3. Univariate Logistic Regression Analysis**

| | Survivors (n=171) | Nonsurvivors (n=264) | P* |
|---|---|---|---|
| Male sex | 145 (85) | 214 (81) | 0.36 |
| Age, y† | | | 0.003 |
| ≤59 | 100 (58) | 116 (44) | |
| >59 | 71 (42) | 148 (56) | |
| Risk factors | | | |
| Hypertension | 64 (41) | 104 (42) | 0.79 |
| Diabetes mellitus | 17 (11) | 54 (23) | 0.002 |
| Dyslipidemia | 54 (35) | 64 (28) | 0.17 |
| Smoking | 81 (58) | 98 (50) | 0.15 |
| Location of cardiac arrest | | | <0.001 |
| Public area | 79 (46) | 91 (34) | |
| Home | 43 (25) | 123 (47) | |
| Other | 49 (29) | 50 (19) | |
| Time from collapse to BLS, min† | | | <0.001 |
| <5 | 102 (62) | 102 (41) | |
| ≥5 | 62 (38) | 148 (59) | |
| Time from BLS to ROSC, min† | | | <0.001 |
| ≤15 | 119 (73) | 104 (40) | |
| >15 | 44 (27) | 157 (60) | |
| Initial arrest rhythm | | | 0.001 |
| VT/VF | 132 (77) | 162 (62) | |
| PEA/asystole | 39 (23) | 99 (38) | |
| Lactate blood, mmol/L‡ | | | <0.001 |
| ≤2 | 72 (42) | 29 (11) | |
| 2 to 4.9 | 50 (29) | 54 (21) | |
| 4.9 to 7 | 27 (16) | 69 (26) | |
| >7 | 22 (13) | 112 (42) | |
| Troponine, μg/L‡ | | | 0.054 |
| <2.3 | 92 (41) | 67 (59) | |
| 2.3 to 11.8 | 52 (23) | 53 (33) | |
| >11.8 | 81 (36) | 43 (26) | |
| Therapeutic hypothermia | 156 (92) | 214 (82) | 0.006 |
| ROSC ECG | | | 0.016 |
| ST-segment elevation | 64 (37) | 70 (27) | |
| Other ECG patterns | 107 (63) | 194 (73) | |
| Successful PCI | 90 (53) | 87 (33) | <0.001 |

Data are presented as n (%), taking into account missing data. VT indicates ventricular tachycardia; VF, ventricular fibrillation; and PEA, pulseless electrical activity.

*$P$ values for comparison between survivors and nonsurvivors obtained from a $\chi^2$ test.

†Age, time from collapse to BLS, and time from BLS to ROSC were classified according to their respective medians.

‡Lactate blood and troponine were classified according to interquartiles.

## Discussion

The PROCAT registry represents the largest cohort of patients with post-OHCA with coronary angiographic data. In this population, a coronary angiogram was performed at admission in 435 patients with no obvious noncardiac cause of arrest regardless of clinical and ECG data obtained in the prehospital setting. At least 1 significant coronary artery lesion was found in 304 (70%) of all patients, in 128 (96%) of 134 patients with ST-segment elevation on the post-ROSC ECG, and in 176 (58%) of 301 patients without ST-segment elevation. The overall hospital survival was 39%. Of interest, this hospital survival rate increased from 31% in patients with no or failed PCI to 51% in patients in whom a successful immediate revascularization was obtained. The multivariable analysis showed successful PCI to be an independent predictive factor of survival, regardless of the initial postresuscitation ECG pattern.

The high incidence of coronary lesions in our cohort confirms previous findings that link ACS and OHCA. Coronary plaque rupture or erosion, fragmentation, and embolization of thrombus are identified as factors able to trigger cardiac arrest. Similar rates have been noted in studies based on postmortem examination of patients with OHCA[14] or angiographic data.[15]

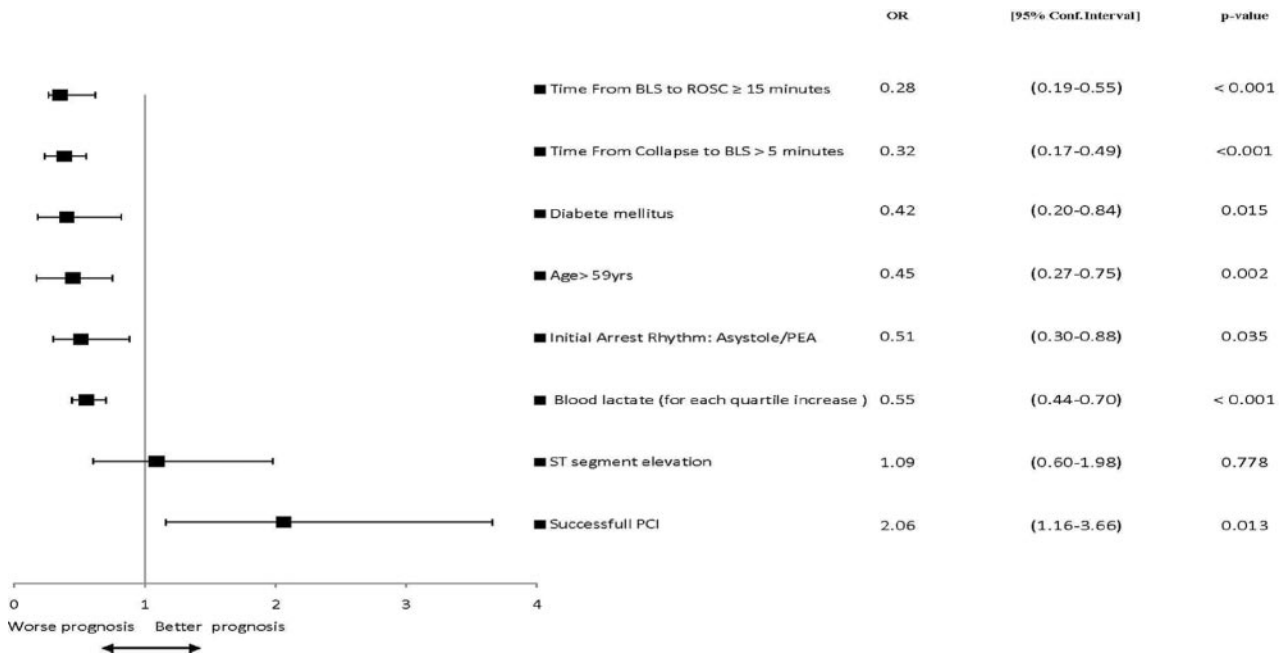


**Figure 3.** Multivariable logistic regression analysis of early predictors of survival in patients with OHCA without obvious extracardiac causes. PEA indicates pulseless electrical activity.

Successful immediate coronary angioplasty was associated with improved hospital survival in patients with or without ST-segment elevation. In most studies, the prognosis of patients with OHCA is extremely poor.[16,17] Recently, Gueugniaud et al[18] reported a very low hospital survival rate in a French cohort of patients with cardiac arrest included in randomized study. Because there is a marked variability between hospitals in the rate of survival among patients who were alive on hospital admission after an OHCA, one possible contributory factor could be the standard of postresuscitation care.[4] We previously demonstrated that successful coronary angioplasty was an independent predictive factor of survival for patients with OHCA without an obvious extracardiac cause of arrest.[6] However, this previous analysis was limited by the low number of patients included. In this large series, more than half of patients with a successful PCI survived to discharge. Even after adjusting for well-known clinical predictors of survival such as age, resuscitation delays, initial rhythm, and blood lactate, successful PCI remains independently associated with survival regardless of the ECG pattern. This finding reinforces guidelines that recommend performing an immediate coronary revascularization in patients with OHCA.

Given the high incidence of ACS in patients with OHCA and the limitations of ECG-based diagnosis, current guidelines recommend considering immediate coronary angiography in all patients with postcardiac arrest in whom ACS is suspected.[9] In clinical practice, ST-segment elevation is still used as a selection criterion for coronary angiography in patients with OHCA.[8] Management of patients with other ECG patterns is controversial. Based on data from a cohort of 72 patients, Anyfantakis et al[11] asserted that immediate PCI was beneficial only in patients with ST-segment elevation. However, in our study, the predictive value of ST-segment elevation for coronary artery occlusion in the setting of OHCA is poor with positive and negative predictive values of 0.96 and 0.42, respectively. Selection of survivors of OHCA for coronary artery angiogram based on the presence or absence of ST-elevation is therefore difficult. Such a strategy could lead to neglecting the existence of an acute coronary artery occlusion in patients without ST-elevation, although this pattern is associated with a high prevalence of coronary artery occlusions, which can be treated by PCI in this population. In patients without ST-segment elevation on postresuscitation ECG, the rate of significant coronary artery lesions was lower compared with patients with ST-segment elevation. However, when significant lesions were diagnosed and PCI performed with success, the survival rate was high and similar to that of patients with ST-segment elevation and successful PCI. Furthermore, by multivariate analysis, successful PCI (but not ST-segment elevation pattern) was independently predictive of survival. Therefore, our findings support the use of immediate coronary angiography in patients with OHCA with no obvious noncardiac cause of arrest, with or without ST-segment elevation.

Our multivariable analysis determined that age, resuscitation delays, ventricular fibrillation or ventricular tachycardia as initial rhythm, and blood lactate at admission are predictive factors for survival. These findings substantiate the crucial importance of public awareness and prehospital OHCA management, which has been extensively documented.[3,10] Prehospital management and triage of patients with OHCA based on prehospital data have been suggested. Morrison et al[19] prospectively evaluated a clinical prediction rule for the termination of BLS resuscitative efforts during OHCA. The rule recommended termination when there was no ROSC, no shocks were administered, and the arrest was not witnessed by emergency medical services personnel. In situations where

all survivors of OHCA are transported to the hospital, a triage could be performed at admission using this rule to select patients for diagnostic procedures such as coronary angiography. However, this predictive rule would have to be validated in a hospital setting, and decisions based on predefined algorithms are sometimes difficult to apply to the management of OHCA, especially in young patients.[20]

The high rate of ventricular fibrillation/ventricular tachycardia as initial rhythm (68%) suggests that our cohort is highly selected compared with other registries. In Paris, OHCA is managed by a prehospital medical team. Careful selection of patients is therefore possible based on clinical findings and hemodynamic status. By design, our study excluded patients with obvious extracardiac cause who most often presented with a nonshockable initial rhythm (71%). Furthermore, only patients with a stable hemodynamic status were admitted to the cardiac catheterization laboratory. This management of OHCA contrasts with that in the United States and many European countries where prehospital management is performed by nonmedical teams, and decisions on cessation of cardiopulmonary resuscitation or invasive strategies are made by emergency department physicians. Hence, a lower rate of patients with a shockable initial rhythm and stable hemodynamics are noted in most registries. In a North American observational study (Resuscitation Outcomes Consortium), Nichol et al[21] observed only 22.9% shockable initial rhythms among 11 898 patients in whom a resuscitation had been attempted. Our findings therefore cannot be applied to all patients with OHCA.

Our observations are obviously limited by the nonrandomized and observational design of our study, which contained no control group. Furthermore, this study was performed in Paris, where prehospital management of OHCA is performed by both fire departments and medical teams according to standard protocols. Patients were managed in a tertiary center by a multidisciplinary team highly experienced in the care of both ACS and cardiac arrest. In particular, hypothermia was performed in nearly 85% of patients, a proportion that reflects a high level of guidelines implementation. These results, therefore, may not be applied in other settings. Follow-up was limited to the hospital stay. However, several studies have demonstrated stable long-term survival rates after discharge in survivors of OHCA.[22,23] The rate of coronary artery disease could have been underestimated because exclusion of patients with an obvious extracardiac cause of arrest was based on clinical criteria. However, similar rates were found in studies based on postmortem findings.[24,25]

In conclusion, in this selected cohort of 435 patients with OHCA of presumed cardiac origin, a high rate of coronary artery lesions was found. The predictive value of postresuscitation ECG data was poor. Successful PCI was associated with an increased hospital survival by multivariate analysis, with similar rates of survival in patients with or without ST-segment elevation. Immediate PCI seems to offer survival benefit in patients with OHCA with no obvious noncardiac cause, regardless of the ECG pattern.

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## Disclosures

None.

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## CLINICAL PERSPECTIVE

For survivors of an out-of-hospital cardiac arrest, the predictive value of the ECG for coronary artery occlusion is poor, and clinical information such as chest pain or risk factors often are lacking. Accordingly, it is difficult to select appropriate patient candidates for early coronary angiography and possible percutaneous intervention. In a tertiary center in Paris, an immediate coronary angiogram was performed in 435 patients with out-of-hospital cardiac arrest with no obvious noncardiac cause of arrest, regardless of ECG pattern. At least 1 significant coronary artery lesion was found in 304 (70%) patients, in 128 of 134 (96%) patients with ST-segment elevation on the ECG performed after the return of spontaneous circulation, and in 176 (58%) of 301 patients without ST-segment elevation. Overall hospital survival rate was 40%. Multivariable analysis showed successful percutaneous intervention to be an independent predictive factor of survival, regardless of the postresuscitation ECG pattern. Immediate percutaneous intervention seems to offer survival benefit in selected patients with out-of-hospital cardiac arrest with no obvious noncardiac cause.